

CLAIMS

What is claimed is:

1. An optical device comprising:
 - a housing receiving a plurality of optical fibers adapted to carry optical signals;
 - a filter disposed within said housing, said filter transmitting specific optical signals having a predetermined wavelength range;
 - a first ball lens coupled to said housing and optically communicating with said filter, said first ball lens positioned relative to said filter and said plurality of optical fibers to collimate, focus and selectively route said optical signals; and
 - a second ball lens coupled to said housing and optically communicating with said filter, said second ball lens positioned relative to said filter and said plurality of optical fibers to collimate, focus and selectively route said optical signals.
2. The optical device of claim 1, wherein said plurality of optical fibers comprises at least an input optical fiber, an output optical fiber, an add optical fiber, and a drop optical fiber.
3. The optical device of claim 1, wherein said ball lenses are fabricated from a material selected from a group consisting of glass, crystal, sapphire, semiconductor, and polymer.
4. The optical device of claim 1, wherein each of said ball lenses are substantially spherical and at least a part of a surface of each said ball lens is coated with an anti-reflective film.

5. The optical device of claim 1, further comprising a spacer ring disposed between said first ball lens and a first side of said filter, said spacer ring fixing the relative position between said first ball lens and said filter.

6. The optical device of claim 1, further comprising a spacer ring disposed between said second ball lens and a second side of said filter, said spacer ring fixing the relative position between said second ball lens and said filter to predetermined values.

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7. An optical device comprising:
 - a housing receiving at least an input optical fiber, an output optical fiber, an add optical fiber, and a drop optical fiber;
 - a wavelength selective filter disposed within said housing, said filter transmitting optical signals of a predetermined range of wavelengths and reflecting optical signals of other wavelengths;
 - a first full ball lens coupled to said housing and optically communicating with said filter, said first full ball lens positioned relative to said input fiber and said output fiber to simultaneously collimate light exiting from said input fiber and focusing light, incident upon a surface of said first full ball lens in close proximity to said filter, into said output fiber; and
 - a second full ball lens coupled to said housing and optically communicating with said filter, said second ball lens positioned relative to said add fiber and said drop fiber to simultaneously collimate light exiting from said add fiber and focus light, incident upon a surface of said second full ball lens in close proximity to said filter, into said drop fiber.

8. The optical device of claim 7, wherein said input optical fiber and said output optical fiber are fixed within a first ferrule, said first ferrule being aligned and bonded to said housing so that said input optical fiber and said output optical fiber are maintained in a fixed position with respect to said first ball lens.

9. The optical device of claim 7, wherein said add optical fiber and said drop optical fiber are fixed within a second ferrule, said second ferrule being aligned and bonded to said housing so that said add optical fiber and said drop optical fiber are maintained in a fixed position with respect to said second ball lens.
10. The optical device of claim 7, wherein each of said fibers has an end face that is polished at a predetermined angle.
11. The optical device of claim 10, wherein each said end face is coated with an anti-reflective film.
12. The optical device of claim 7, wherein a part of a surface of each of said first ball lens and said second ball lens through which the light passes is coated with an anti-reflection film.
13. The optical device of claim 7 further comprising a first spacer ring disposed between said first ball lens and a first side of said filter for fixing the relative position between said first ball lens and said filter.
14. The optical device of claim 13, further comprising a second spacer ring disposed between said second ball lens and a second side of said filter for fixing the relative position between said second ball lens and said filter.

15. The optical device of claim 7, wherein a diameter of each ball lens is determined based on a material from which the lens is formed.

16. The optical device of claim 7, wherein a diameter of each ball lens is determined based on a wavelength of the optical signal passing therethrough.

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17. An optical device comprising:

a housing receiving at least one of an input optical fiber, an output optical fiber, an add optical fiber, and a drop optical fiber;

a first ball lens coupled to said housing, said first ball lens positioned relative to said input fiber and said output fiber to simultaneously collimate light exiting from said input fiber and focus said light into said output fiber,;

a second ball lens coupled to said housing, said second ball lens positioned relative to said add fiber and said drop fiber to simultaneously collimate light exiting from said add fiber and focus light into said drop fiber;

a wavelength selective filter disposed between said first and second ball lenses, said filter transmitting light of a predetermined range of wavelengths and reflecting light of other wavelengths.

18. The optical device of claim 17, wherein a secondary housing at least partially surrounds said housing.

19. The optical device of claim 17, wherein said input optical fiber and said output optical fiber are disposed within a ferrule that is surrounded by said housing.

20. The optical device of claim 19, wherein said housing comprises a plurality of ports, said ports configured to receive an adhesive to securely retain said ferrule within said housing.

21. The optical device of claim 20, wherein at least one of said plurality of ports receives an adhesive to aid in securely retaining at least one of said first ball lens and said second ball lens.
22. The optical device of claim 21, further comprising at least one support member cooperating with said adhesive and at least one of said first ball lens and said second ball lens.
23. The optical device of claim 22, wherein said at least one support member includes an aperture through which light may propagate.

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